FAIRCHILD
A Schlumberger Company

IRF340-343/IRF740-743 T-39-13
MTM8N35/8N40
N-Channel Power MOSFETs, 10 A, 350 V/400 V

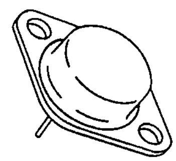
Power And Discrete Division

Description

These devices are n-channel, enhancement mode, power MOSFETs designed especially for high voltage, high speed applications, such as off-line switching power supplies, UPS, AC and DC motor controls, relay and solenoid drivers.

- V_{GS} Rated at ±20 V
- Silicon Gate for Fast Switching Speeds
- I_{DSS}, $V_{DS(on)}$, SOA and $V_{GS(th)}$ Specified at Elevated Temperature
- Rugged

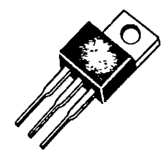
TO-204AA



IS00020F

IRF340
IRF341
IRF342
IRF343
MTM8N35
MTM8N40

TO-220AB



IS00010F

IRF740
IRF741
IRF742
IRF743

Maximum Ratings

Symbol	Characteristic	Rating IRF340/342 IRF740/742 MTM8N40	Rating IRF341/343 IRF741/743 MTM8N35	Unit
V_{DSS}	Drain to Source Voltage	400	350	V
V_{DGR}	Drain to Gate Voltage R_{GS} = 1.0 MΩ	400	350	V
V_{GS}	Gate to Source Voltage	±20	±20	V
T_J, T_{stg}	Operating Junction Temperature Storage Temperature	−55 to +150	−55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8″ From Case for 5 s	275	275	°C

Maximum On-State Characteristics

		IRF340/341 IRF740/741	IRF342/343 IRF742/743	MTM8N35 MTM8N40	
$R_{DS(on)}$	Static Drain-to-Source On Resistance	0.55	0.80	0.55	Ω
I_D	Drain Current Continuous Pulsed	10 40	8 32	8 48	A

Maximum Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.0	1.0	0.83	°C/W
P_D	Total Power Dissipation at T_C = 25°C	125	125	150	W

Notes
For information concerning connection diagram and package outline, refer to Section 7.

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Electrical Characteristics ($T_C = 25°C$ unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage[1]			V	$V_{GS} = 0$ V, $I_D = 250$ μA
	IRF340/342/740/742	400			
	IRF341/343/741/743	350			
I_{DSS}	Zero Gate Voltage Drain Current		250	μA	V_{DS} = Rated V_{DSS}, $V_{GS} = 0$ V
			1000	μA	$V_{DS} = 0.8$ x Rated V_{DSS}, $V_{GS} = 0$ V, $T_C = 125°C$
I_{GSS}	Gate-Body Leakage Current IRF340-343 IRF740-743		 ±100 ±500	nA	$V_{GS} = \pm 20$ V, $V_{DS} = 0$ V
On Characteristics					
$V_{GS(th)}$	Gate Threshold Voltage	2.0	4.0	V	$I_D = 250$ μA, $V_{DS} = V_{GS}$
$R_{DS(on)}$	Static Drain-Source On-Resistance[2] IRF340/341/740/741 IRF342/343/742/743		 0.55 0.80	Ω	$V_{GS} = 10$ V, $I_D = 5.0$ A
g_{fs}	Forward Transconductance	4.0		S (℧)	$V_{DS} = 10$ V, $I_D = 5.0$ A
Dynamic Characteristics					
C_{iss}	Input Capacitance		1600	pF	$V_{DS} = 25$ V, $V_{GS} = 0$ V f = 1.0 MHz
C_{oss}	Output Capacitance		450	pF	
C_{rss}	Reverse Transfer Capacitance		150	pF	
Switching Characteristics ($T_C = 25°C$, *Figures 9, 10*)					
$t_{d(on)}$	Turn-On Delay Time		35	ns	$V_{DD} = 175$ V, $I_D = 5.0$ A $V_{GS} = 10$ V, $R_{GEN} = 4.7$ Ω $R_{GS} = 4.7$ Ω
t_r	Rise Time		15	ns	
$t_{d(off)}$	Turn-Off Delay Time		90	ns	
t_f	Fall Time		35	ns	
Q_g	Total Gate Charge		60	nC	$V_{GS} = 10$ V, $I_D = 12$ A $V_{DD} = 400$ V

Symbol	Characteristic	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics					
V_{SD}	Diode Forward Voltage IRF340/341/740/741 IRF342/343/742/743		 2.0 1.9	 V V	 $I_S = 10$ A; $V_{GS} = 0$ V $I_S = 8$ A; $V_{GS} = 0$ V
t_{rr}	Reverse Recovery Time	600		ns	$I_S = 10$ A; $dI_S/dt = 100$ A/μS

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Electrical Characteristics ($T_C = 25°C$ unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage[1]			V	$V_{GS} = 0$ V, $I_D = 5.0$ mA
	MTM8N40	400			
	MTM8N35	350			
I_{DSS}	Zero Gate Voltage Drain Current		0.25	mA	$V_{DS} = 0.85 \times$ Rated V_{DSS}, $V_{GS} = 0$ V
			2.5	mA	$V_{DS} = 0.85 \times$ Rated V_{DSS}, $V_{GS} = 0$ V, $T_C = 100°C$
I_{GSS}	Gate-Body Leakage Current		±500	nA	$V_{GS} = \pm 20$ V, $V_{DS} = 0$ V
On Characteristics					
$V_{GS(th)}$	Gate Threshold Voltage	2.0	4.5	V	$I_D = 1.0$ mA, $V_{DS} = V_{GS}$
		1.5	4.0	V	$I_D = 1.0$ mA, $V_{DS} = V_{GS}$ $T_C = 100°C$
$V_{DS(on)}$	Drain-Source On-Voltage[2]		2.2 5.3	V V	$V_{GS} = 10$ V; $I_D = 4.0$ A $V_{GS} = 10$ V; $I_D = 8.0$ A
			4.4	V	$V_{GS} = 10$ V, $I_D = 4.0$ A $T_C = 100°C$
$R_{DS(on)}$	Static Drain-Source On-Resistance[2]		0.55	Ω	$V_{GS} = 10$ V, $I_D = 4.0$ A
g_{fs}	Forward Transconductance	3.0		S (℧)	$V_{DS} = 10$ V, $I_D = 4.0$ A
Dynamic Characteristics					
C_{iss}	Input Capacitance		1800	pF	$V_{DS} = 25$ V, $V_{GS} = 0$ V f = 1.0 MHz
C_{oss}	Output Capacitance		350	pF	
C_{rss}	Reverse Transfer Capacitance		150	pF	
Switching Characteristics ($T_C = 25°C$, *Figures 9, 10*)[3]					
$t_{d(on)}$	Turn-On Delay Time		60	ns	$V_{DD} = 25$ V, $I_D = 4.0$ A $V_{GS} = 10$ V, $R_{GEN} = 50$ Ω $R_{GS} = 50$ Ω
t_r	Rise Time		150	ns	
$t_{d(off)}$	Turn-Off Delay Time		200	ns	
t_f	Fall Time		120	ns	
Q_g	Total Gate Charge		60	nC	$V_{GS} = 10$ V, $I_D = 12$ A $V_{DD} = 400$ V

Notes
1. $T_J = +25°C$ to $+150°C$
2. Pulse test: Pulse width ≤ 80 μs, Duty cycle ≤ 1%
3. Switching time measurements performed on LEM TR-58 test equipment.

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Typical Performance Curves

Figure 1 Output Characteristics

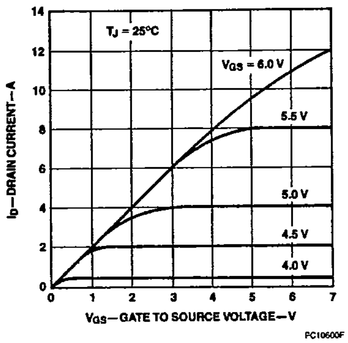


Figure 2 Static Drain to Source Resistance vs Drain Current

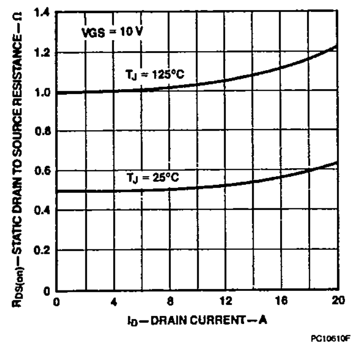


Figure 3 Transfer Characteristics

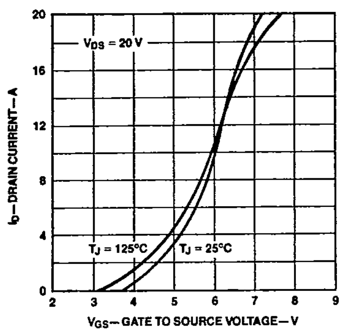


Figure 4 Temperature Variation of Gate to Source Threshold Voltage

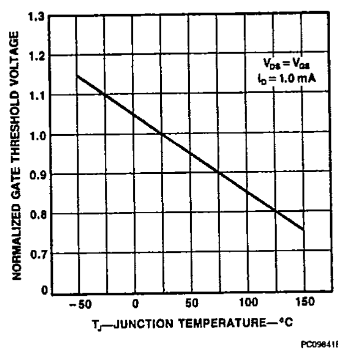


Figure 5 Capacitance vs Drain to Source Voltage

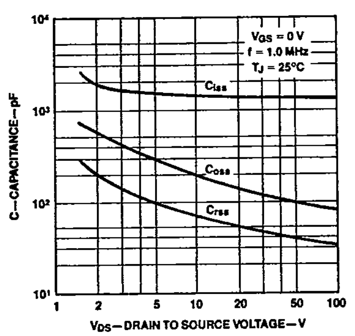
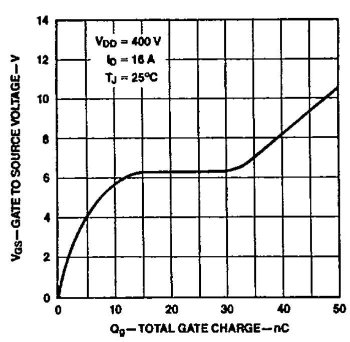


Figure 6 Gate to Source Voltage vs Total Gate Charge



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Typical Performance Curves (Cont.)

Figure 7 Forward Biased Safe Operating Area

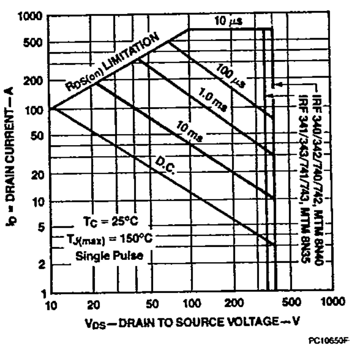
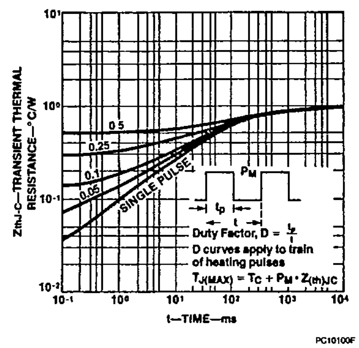


Figure 8 Transient Thermal Resistance vs Time



Typical Electrical Characteristics

Figure 9 Switching Test Circuit

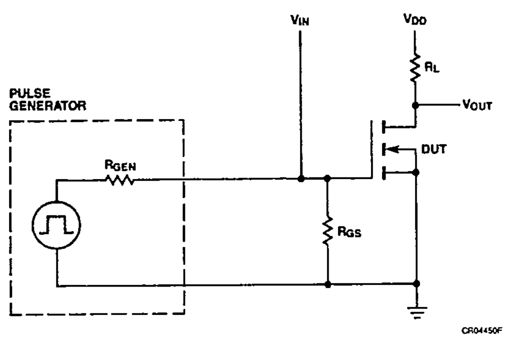


Figure 10 Switching Waveforms

